College of Science and Engineering

Department of Biomedical Sciences

Seminar

Neurodegeneration in the Retina

Dr. Wenjun Xiong

Department of Biomedical Sciences, City University of Hong Kong

Changes in Cortical Properties Induced by Neurodegeneration in the Retina

Dr. Leanne Chan

Department of Electronic Engineering, City University of Hong Kong

Date: 9 April 2018 (Monday)

Time: 12:00 nn – 1:30 pm (Reception with light sandwiches at 11:45am, talks start at 12nn. To facilitate the order of sandwiches, please register through email chchung33@cityu.edu.hk.)

Venue: B6605, Yeung Kin Man Academic Building, City University of Hong Kong

Two Presentations of 30 min each, followed by a 30 min discussion on collaboration activities

Neurodegeneration

1. Neurodegeneration in the Retina

Neurodegenerative disorders are often caused by the irreversible loss of neurons. Currently, patients with retinal degeneration diseases, such as age-related macular degeneration (AMD), diabetic retinopathy (DR), and retinitis pigmentosa (RP), have very few treatment options. Their vision loss is irreversible due to the loss of the photoreceptors, the light-sensing neurons in the retina. By using a combination of molecular, cellular and genetic approaches, we aim to promote endogenous photoreceptor regeneration by Müller glia, the non-neuronal cells in the retina with the progenitor potentials.

Biography

Dr Xiong received her PhD in Biomedical Sciences at the University of Chicago in 2010. Under the supervision of Prof. Ilaria Rebay, she studied how multiple signaling pathways interact in space and time to ensure the accurate developmental program of the Drosophila compound eye. In 2011, she joined the laboratory of Prof. Constance Cepko at Harvard Medical School, where she studied the disease mechanisms of inherited blindness and developed gene therapies to prolong vision in mouse models. In August 2015, she joined the Department of Biomedical Sciences at City University of Hong Kong as an Assistant Professor.

Seminar

2. Changes in Cortical Properties Induced by Neurodegeneration in the Retina

Under circumstances in which the retinas of individuals undergo degeneration, reorganization along the visual pathway occurs, including the neural retina and the visual cortex. The study of the condition of visual organization after deprivation of sensory input is essential because many of the most promising treatments aimed at restoring visions at the retinal level, such as retinal prosthetics, stem-cell therapy and gene-specific approach, rely on the assumption that cortical circuitry remains largely intact.

The present study focused on the comparison between receptive field properties in the primary cortex neurons from the experimental animal model with retinal degeneration S334ter-3 rats and the control group Long-Evans rats. By conducting extracellular recording, we examined the electrophysiological properties of the primary visual cortex neurons (V1) in the S334ter-3 rats. We measured the orientation tuning, spatial and temporal frequency tunings and the receptive field size for 127 V1 neurons from 11 S334ter-3 rats and 10 Long-Evans rats. V1 neurons in the S334ter-3 rats showed weaker orientation selectivity, lower optimal spatial and temporal frequency values and a smaller receptive field size compared to the normal sighted group. These results suggest that the visual cognitive ability significantly changes during the intermediate stage of retinal degeneration. The behavioural studies of the animal model with retinal degeneration (S334ter-3 rat) will also be highlighted.

Biography

Dr. Leanne Chan is Assistant Professor of Electronic Engineering. She earned her undergraduate degree in electrical and electronic engineering at the University of Hong Kong, Hong Kong. She obtained her MS and PhD degrees in electrical engineering and biomedical engineering respectively from University of Southern California, Los Angeles, United States. Following a couple of years of postdoctoral work at the Developmental Neuroscience Program of the Saban Research Institute, Children's Hospital of Los Angeles, she joined the faculty of the City University of Hong Kong in December 2011. Dr. Chan is a senior member of the IEEE Society. She is a member of the Society of Neuroscience and the Engineering in Medicine and Biology Society (EMBS).

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